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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/538,689

06/10/2005

Kouichiro Inomata

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38834

7590

04/28/2008

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EXAMINER

INGHAM, JOHN C

ART UNIT

PAPER NUMBER

2814

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/538,689	<b>Applicant(s)</b> INOMATA ET AL.	
	<b>Examiner</b> JOHN C. INGHAM	<b>Art Unit</b> 2814	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 14 January 2008.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 June 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                       | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>1/14/08</u> .   | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 14 January 2008 has been entered.

### ***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims **1-20** are rejected under 35 U.S.C. 102(b) as being anticipated by EP 1 085 586, hereinafter the '586 Pub.

Regarding claims **1-5**, the '586 Pub discloses in Fig 10 a spin injection device comprising a spin injection part having a spin polarization part (102 antiferromagnetic layer fixes the spin of layer 103) capable of tunnel junction (¶62), and an injection junction part (104, nonmagnetic insulating layer), an SyAF (105) having a first magnetic layer (105a) and a second magnetic layer (105c) having different magnitudes of magnetization (¶58-59, thickness of free magnetic layers is different), and magnetically

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coupled together antiparallel to each other (¶64) via a nonmagnetic layer (105b), wherein: said first magnetic layer of SyAF and said junction part are bonded (105a and 104 are bonded).

4. The claim language “a spin polarization electron is injected from said spin injection part by flowing electric current between said spin polarizing part and said second magnetic layer, and magnetization of said first and second magnetic layers is reversed while maintained in antiparallel state without applying an external magnetic field” describes an intended use of the claimed structure. Intended use and other types of functional language must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto, 136 USPQ 458, 459 (CCPA 1963). In this case, the structure set forth by the '586 Pub meets the claimed structural limitations.

5. Regarding claim 6, the '568 Pub discloses in Fig 36 the device of claim 1, wherein the aspect ratio ( $T1/W$  and  $T2/W$ , ¶194) of the first and second magnetic layers of SyAf in contact with the injection junction part is less than 2.

6. Regarding claim 7, the '586 Pub discloses in Fig 10 a spin injection magnetic apparatus comprising a free layer (105) having a first and second magnetic layer (105a and 105c) coupled together magnetically antiparallel to each other via a nonmagnetic layer (105b), and in which magnitudes of magnetization are different (¶58-59, thickness

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of free magnetic layers is different), and the magnetization of said first and second magnetic layer is capable of magnetization reversal while maintaining the antiparallel state (¶64), and a ferromagnetic fixed layer (103) tunnel-junctioned (¶62) with the first magnetic layer (105a) said free layer via an insulating layer (104), wherein said ferromagnetic fixed layer and said free layer are made to be a ferromagnetic spin tunnel junction.

7. The claim language “the magnetization of said first and second magnetic layers is reversed by flowing electric current between said second magnetic layer of the free layer and said ferromagnetic fixed layer while maintained in antiparallel state without applying an external magnetic field” describes an intended use of the claimed structure. Intended use and other types of functional language must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto, 136 USPQ 458, 459 (CCPA 1963). In this case, the structure set forth by the ‘586 Pub meets the claimed structural limitations.

8. Regarding claims **8-12**, the ‘586 Pub discloses in Fig 10 the apparatus of claim 7, provided with a spin injection part (102 antiferromagnetic layer fixes spin of ferromagnetic layer 103) having an injection junction part (104, nonmagnetic insulating

layer) connected to said free layer (105, ¶58) and a spin polarization part (102, capable of tunnel junction ¶62).

9. Regarding claim **13**, the '568 Pub discloses in Fig 36 the device of claim 7, wherein the aspect ratio ( $T1/W$  and  $T2/W$ , ¶194) of the first and second magnetic layers of SyAf in contact with the injection junction part is less than 2.

10. Regarding claim **14**, the '568 Pub discloses in Fig 7 the apparatus wherein said spin injection part (71) may be a word line.

11. Regarding claims **15-18**, the '568 Pub discloses in Fig 10 a spin injection device comprising: a spin injection part having a spin polarization part (102) including a ferromagnetic fixed layer (103) and an injection junction part (104) of a nonmagnetic layer, and a ferromagnetic free layer (105 made of Co or Co alloy, ¶40) provided in contact with said spin injection part, wherein: said nonmagnetic layer of the injection junction part is made of an insulator (dielectric, ¶63), a nonmagnetic layer (106 made of Ru and 0.5 to 2.5nm thick ¶41) and a ferromagnetic fixed layer (107 of Co or Co alloy ¶40) is provided on the surface of said ferromagnetic free layer.

12. The claim language "the magnetization of said ferromagnetic free layer is reversed by flowing electric current between the spin polarization part and said nonmagnetic layer provided on the surface of said ferromagnetic free layer in the direction perpendicular to the film surface without applying an external magnetic field" describes an intended use of the claimed structure. Intended use and other types of functional language must result in a structural difference between the claimed invention

and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto, 136 USPQ 458, 459 (CCPA 1963). In this case, the structure set forth by the '586 Pub meets the claimed structural limitations.

13. Regarding claims **19 and 20**, the '568 Pub discloses in Fig 9 a magnetic apparatus (memory device) using the spin injection device of claim 17.

### ***Response to Arguments***

14. Applicant's arguments filed 1 June 2007 have been fully considered but they are not persuasive. Regarding the argument on page 10 that Inomata does not specify that the magnitudes of the magnetization of the first and second magnetic layers are different from one another, Inomata (¶58) discloses that the layers may be of different thicknesses, which creates a different magnitude of the magnetic layers in accordance with the instant specification. Paragraph 47 of the instant specification recites "in order to make difference in the magnitude of antiparallel magnetizations of the magnetic layers,  $t_1M_1$  and  $t_2M_2$  may be different". Therefore, magnitude of magnetization can be changed by a structural change of different thicknesses. As stated on page 10 of the arguments, magnitude can be changed by application of current, but that property is an intended use and not a structural limitation. Intended use and other types of functional language must result in a structural difference between the claimed invention and the

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prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto, 136 USPQ 458, 459 (CCPA 1963).

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOHN C. INGHAM whose telephone number is (571)272-8793. The examiner can normally be reached on M-F, 8am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Howard Weiss/  
Primary Examiner  
Art Unit 2814

John C Ingham  
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Examiner, Art Unit 2814